# VS102 Electronic Vibration Switch

# User Manual

## Installation, Operation, Maintenance

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# VS102 Electronic Vibration Switch - Introduction

The VS102 Electronic Vibration Switch is designed to be the cost effective solution for vibration switch applications. The VS102's unique and rugged design is suitable for harsh environments and hazardous areas. It has a universal mounting feature, relays or triacs, and a 4-20mA output.

## Specifications

**Sensor:** internal piezoelectric accelerometer

**Frequency Range:** 2 to 1000 Hz

**4-20mA Source Output:** Non-linearity±1%. 600 ohms max. load resistance

**Field Wiring:** Wire clamp type screw terminal block. Max. wire gauge: 12-22 AWG. 500 Vrms, circuit to case

**Buffered Dynamic Signal:**
Capable of driving 300 meters (1000 feet) of shielded cable (0.03uF max)

**Alarms:** Dual alarms
Dry-contact relay: 5A 230VAC/115VAC or 5A 30VDC
Triac: 5A 230VAC. Optically Isolated, Standard NC

**Temperature Limit:**
-40℃ to +75℃ (-40℉ to +167℉)

**Power Supply:**
95 - 250VAC@100mA, 50-60Hz, or
22 - 30VDC @ 200mA

**Enclosure:** Cast Aluminum (copper free)

**Coating:** Standard plastic coating for all cased aluminum parts outside. Mounting plate is LY12CZ aluminum alloy, mounting stud and local reset are 304 stainless steel.

**Environmental Rating:** NEMA 4X, IP65

**Hazard Rating:** See order information

## Physical

**Temperature:**
Operation: -40℃ to +75℃ (-40℉ to +167℉)
Storage: -50℃ to +120℃ (-58℉ to +248℉)

**Dimensions:**
See attached drawing

**Weight:**
1.4kg (3 lbs)

## System Default Setting

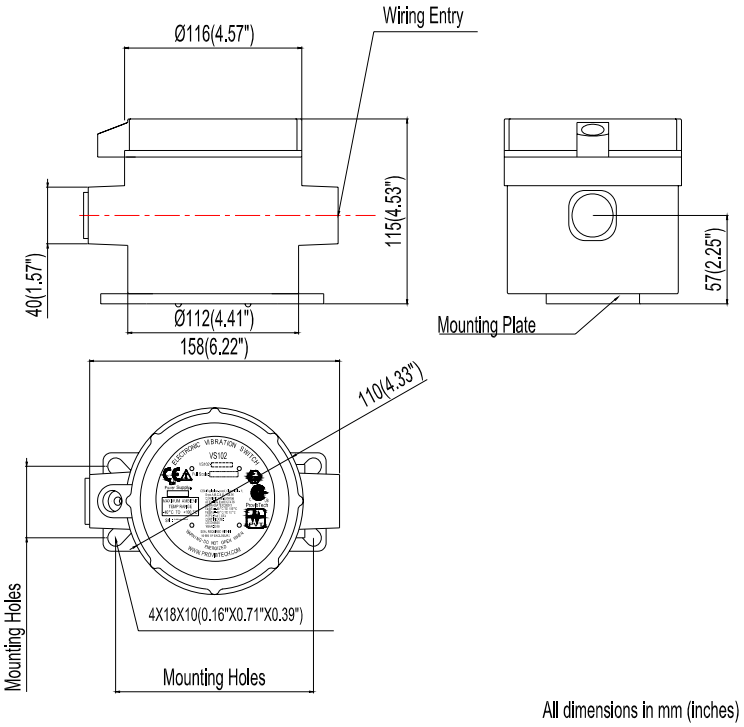
- ✓ Channel Type: default is Acceleration input, velocity output.
- ✓ Transducer type: internal piezoelectric accelerometer
- ✓ Transducer location: internal
- ✓ Transducer sensitivity: default is 100mv/g
- ✓ ALERT time delay: default is 6S
- ✓ DANGER time delay: default is 6S
- ✓ System start up time delay: default is 30S*
- ✓ Full scale: default is 25mm/s
- ✓ Measurement type: default is RMS
- ✓ Measurement unit: default is mm/s
- ✓ Alarm type: (Alert; GAP). The default is Alert
- ✓ Alarm latching**: default is latching
- ✓ Alarm: dual dry contact relays; single dry contract relays; dual TRIAC NO; dual TRIAC NC; single TRIAC NO; single TRIAC NC;. The default is dual dry contact relays
- ✓ ALERT high: default is 12.5mm/s
- ✓ DANGER high: default is 18.75mm/s
- ✓ GAP high: default is 17.5V
- ✓ GAP low: default is -2V

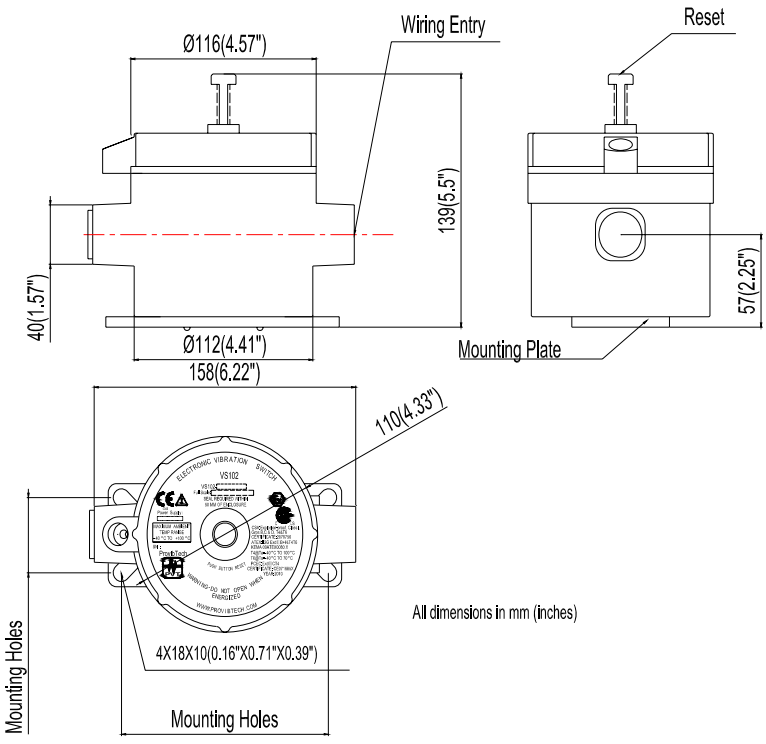
*Output current is 3mA before power on delay time.

**Latching: The alarm status of the vibration switch does not change while the measured variable goes below the alarm setpoint after it has alarmed.

# VS102 System Installation

## Installation - Mechanical Outline Drawing

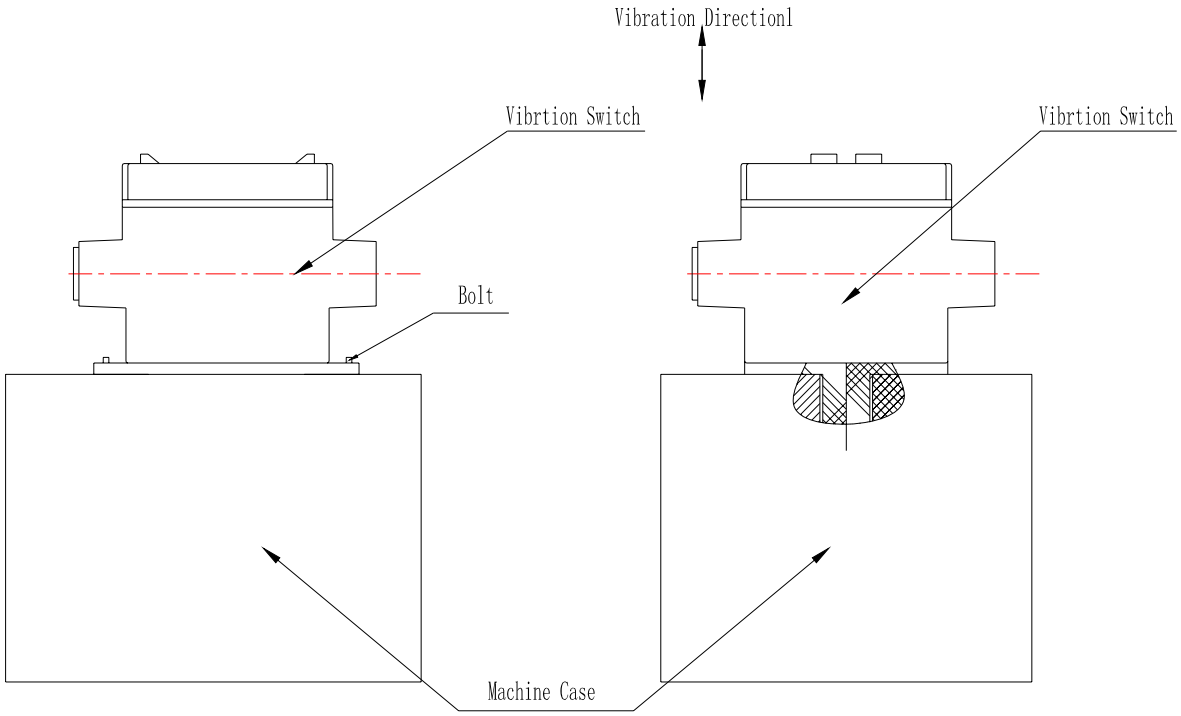


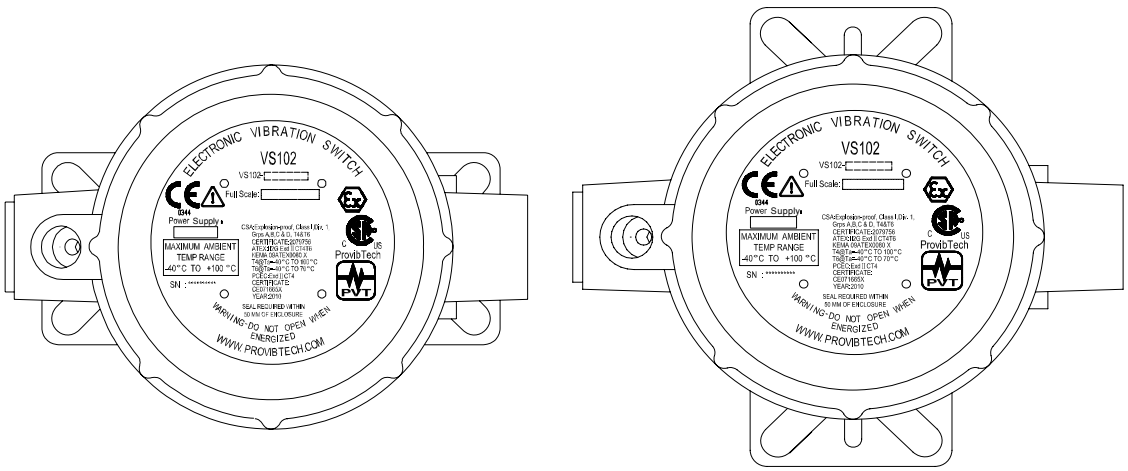

Note: The default case has no local Reset.

## Installation – Hardware

VS102 has two different mounting plates and two different mounting studs. See figuration below. Be aware of that VS102 will sense the vibration in the vertical axis reference to the mounting plate.

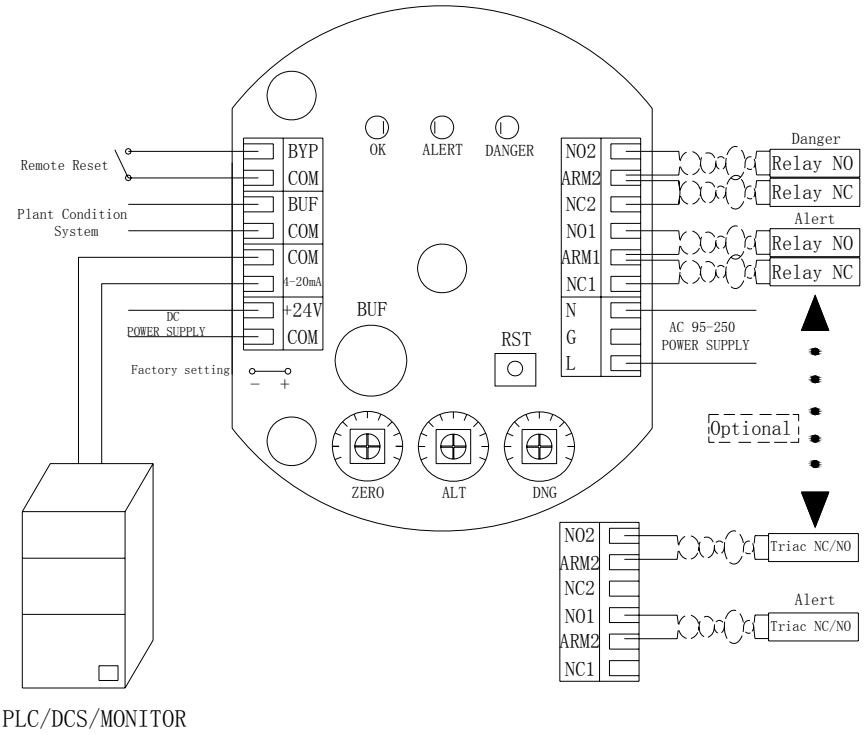



Mounting plate has two different fixed modes. See figuration below. Default fixed mode is as shown in left figuration.



## Installation – Field-Wiring Diagram

***Connector Setting:***




Note: 1.Select Relay/Triac NO/Triac NC as per Alarm option
2. If single alarm is selected, Alert is valid only

***Function Description:***

RST/BYP: Alarms reset / Bypass(When short circuit with COM, OK/TX/BYPASS LED turns red, alarm status draws back). There are two types of bypass, hardware bypass and software bypass. When hardware or software bypass is active, the Bypass LED comes on. Both types of bypass do not take effect on monitoring except the alarm. They are valid for both Alert alarm and GAP alarm. The default status is inactive. Bypass has a higher privilege than alarm latch does.

COM: System ground
BUF: Buffered output
4-20mA: Transmitting of overall to up-level PLC/ DCS/monitor/computer
NC1: Alarm 1. Normally closed
ARM1: Alarm 1. Arm
NO1: Alarm1. Normally open
NC2: Alarm2. Normally closed
ARM2: Alarm 2. Arm
NO2: Alarm 2. Normally open
+24V: Power input (DC)
POW+/POW-:Power input(AC)

**Caution:**

**Power Supply： J101 for AC power supply and J105 for DC. Wrong setting will destroy the switch!**

# VS102 Operation

## VS102 Display and Status

VS102 will have status indication:

- ✓ BUF: Buffered output.
- ✓ OK: green/red LED. Normally green. With not OK or no power supply, the LED is off. In bypass mode, the LED is red.
- ✓ ALERT: yellow LED
- ✓ DANGER: red LED

## VS102 Field Controls

- ✓ Reset: There are two ways to perform reset: 1. by pressing RESET/SET button; 2. by pressing Local button; there is a lever on the instrument cover, whose being pressed will cause the alarm reset. Note: It works only when the measured variable is less than the alarm set-point.
- ✓ Remote reset / Bypass: Brief short the RST/BYP pin to COM will reset the system. Continue short the RST/BYP pin to COM will disable the alarms to realize bypass.
- ✓ Buffered output: a raw signal can be accessed by the BUF pin. There is 100 ohms output impedance. The output can drive up to 300 meters (1000 ft) in distance between a condition monitoring system and VS102.
- ✓ Alarms: User could select it as per category (Dual SPDT Relays Single SPDT Relay Single SPST Triac, NO Dual SPST Triacs, NO Single SPST Triac, NC Dual SPST Triacs, NC）
- ✓ Power input: VS102 can be configured to work with either high voltage (95 to 250 VAC) or low voltage (22 to 30 VDC).

## VS102 Zero Set-Point Configuration

VS102 can be field configured with zero set-point.

- ✓ Power on.
- ✓ Connect an ampere meter to the 4-20mA terminal.
- ✓ Zero Adjust: Hold down RESET/SET button for 10s, OK LED and Alert LED flash and the instrument changes into 4mA calibration mode. Adjust the ZERO Potentiometer to make the instrument output a current of 4mA. Press RESET/SET button again until OK LED, ALERT LED and DANGER LED flash. At last, press RESET/SET button to withdraw from calibration mode.

## VS102 Alarm Set-Points Configuration

VS102 can be field configured with alarms set-points.

Alert Adjust:

A) Setup Alarms by Appling Multi-meter.

- ✓ Power on.
- ✓ Connect an ampere meter to the 4-20mA terminal.
- ✓ Hold down RESET/SET button for 10s, OK LED and Alert LED flash and the instrument changes into 4mA calibration mode. Press the RESET button again until only the Alert light flashes, symbolizing Alert adjust began. Adjust the knob of ALT Potentiometer to set 4-20mA output to required value (The current output will now be a value between 4 and 20 that corresponds to the desired set-point. For example, if you have a full scale of 0-10mils and you want your Alert set-point to be 5 mils then you would adjust the knob of ALT Potentiometer until the output reads 12mA (50%)). Press RESET/SET button again until OK LED, ALERT LED and DANGER LED flash. At last, press RESET/SET button to withdraw from calibration mode.

B) Setup Alarms with only a Screwdriver.

- ✓ Power on.
- ✓ Adjust the knob of ALT Potentiometer to the required position.

Danger Adjust:

A) Setup Alarms by Appling Multi-meter.

- ✓ Power on.
- ✓ Connect an ampere meter to the 4-20mA terminal.
- ✓ Hold down RESET/SET button for 10s, OK LED and Alert LED flash and the instrument changes into 4mA calibration mode. Press the RESET button again until only the DANGER light flashes, symbolizing Danger adjust began. Adjust the knob of DNG Potentiometer to set 4-20mA output to required value. Press RESET/SET button again until OK LED, ALERT LED and DANGER LED flash. At last, press RESET/SET button to withdraw from calibration mode.

B) Setup Alarms with only a Screwdriver.

- ✓ Power on.
- ✓ Adjust the knob of DNG Potentiometer to the required position.

**Warning：Setup without multi-meter may lead to large set-point error**

| FLASH LED | 4mA | Set Alert | Set Danger | Set End |
|---|---|---|---|---|
| OK | ✓ | | | ✓ |
| ALERT | ✓ | ✓ | | ✓ |
| DANGER | | | ✓ | ✓ |

# VS102 Maintenance

## Order Information

**VS102-ABCD-EFGG**

A: Alarms***

A = 0: Dual SPDT Relays

A = 1*: Single SPDT Relay

A = 2: Single SPST Triac, NO

A = 3: Dual SPST Triacs, NO

A = 4: Single SPST Triac, NC

A = 5: Dual SPST Triacs, NC

B: Conduit Entries

B = 0*: 3/4" NPT

B = 1: M20×1.5

C: Mounting Plate or Mounting Stud

C = 0*: Mounting Plate PT500-13

C = 1: Mounting Plate PT500-14

C = 2: Mounting Stud 3/4" NPT

C = 3: Mounting Stud M20×1.5

D: Power Supply

D = 0*: 115VAC or 230VAC

D = 1: 24VDC

E: Hazardous Area Approvals

E = 0: CE Mark (With Local Reset)

E = 1: Multiple approvals (With Local Reset):

CSA: Class I, Div 1, Groups B, C, D, T4 & T6

CERTIFICATE: 2079756

ATEX: II 2 G Ex d ⅡB+ $H_2$T4 T6

KAMA 09ATEX0080 X

T4@Ta= -40℃ to +100℃

T6@Ta= -40℃ to +70℃

PCEC: Ex d ⅡB+ $H_2$T4/T6 Gb

CE Mark

E = 2: Multiple approvals (No Local Reset):

CSA: Class I, Div 1, Groups A, B, C, D, T4 &T6

CERTIFICATE: 2079756

ATEX: II 2 G Ex d ⅡC T4 T6

KAMA 09ATEX0080 X

T4@Ta= -40℃ to +100℃

T6@Ta= -40℃ to +70℃

PCEC: Ex d ⅡC T4/T6 Gb

CE Mark

E = 3*: CE Mark (No Local Reset)

E = 4: Multiple approvals (Whit Local Reset):

TR CU: 1Ex d IIB+H2T4,T6 X

№ TC RU C-US.ГБ05.B.00476

NANIO CCVE

CE Mark

E = 5: Multiple approvals (No Local Reset):

TR CU: 1Ex d IIC T4 ,T6 X

№ TC RU C-US.ГБ05.B.00476

NANIO CCVE

CE Mark

F: 4-20mA Outputs

F = 0: None

F = 1*: 4-20mA

GG: Full Scale

GG = 09: 0 - 5.0g pk

GG = 10: 0 - 10.0g pk

GG = 11: 0 - 20.0g pk

GG = 20: 0 –12.5mm/s pk

GG = 21: 0 –20mm/s pk

GG = 22: 0 –25mm/s pk

GG = 23: 0 –50mm/s pk

GG = 24: 0 –100mm/s pk

GG = 30: 0 –12.5mm/s rms

GG = 31: 0 –20mm/s rms

GG = 32*: 0 –25mm/s rms

GG = 33: 0 –50mm/s rms

GG = 34: 0 –100mm/s rms

GG = 40: 0 –0.5ips pk

GG = 41: 0 –1.0ips pk

GG = 42: 0 –2.0ips pk

GG = 43: 0 –4.0ips pk

GG = 50: 0 –0.5ips rms

GG = 51: 0 –1.0ips rms

GG = 52: 0 –2.0ips rms

GG = 53: 0 –4.0ips rms

Note:

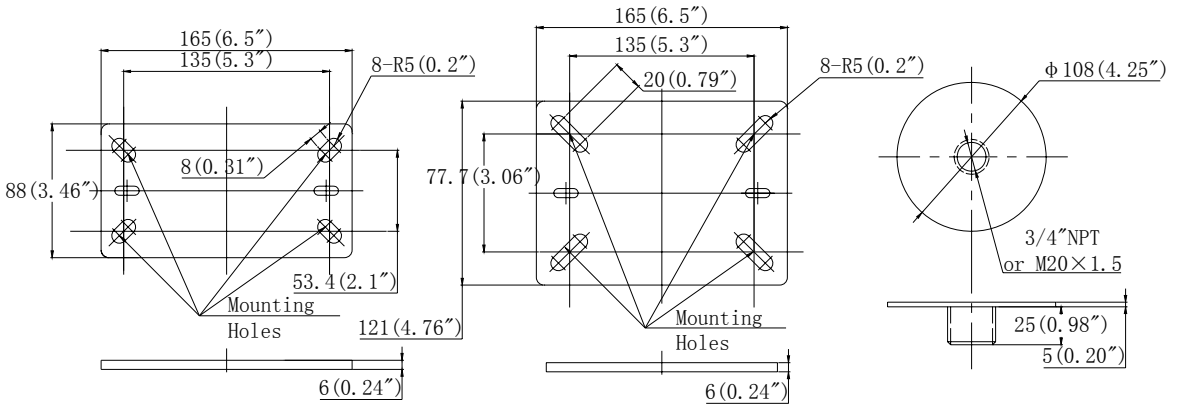
* Factory default

*** Alarm delays 6s and relay works in non-energized mode. Default setting is alarm latching.

Note: when user set 4-20mA Outputs item to None, the instrument keeps current output of 3mA.

CAUTION： Due to different regulation and requirement, Unit sale in East Asia countries will be factory configured as non-latching with no local reset option selected.

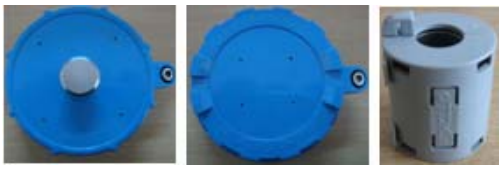
**Mounting Plate , Mounting Studs and Accessories:**




All dimensions in mm (inches)

PT500-13 PT500-14 PT500-15(3/4" NPT)

PT500-17(M20 x 1.5)



Cover1* PT500-2 Cover2* PT500-3 magnetic ring*** PT500-10

Note:

* Cover1: Relates to the E option; if E=0 or 1, the factory default option is Cover1.

** Cover2: Relates to the E option; if E=2 or 3, the factory default option is Cover2.

*** Magnetic ring: One at the factory default setting. When in extremely environment or both ends of the vibration switch have wires, user should order additional accessories to acquire good effects. Please refer to figure Trouble Shooting 6 for installation method.

## Trouble Shooting

1. The instrument is NOT OK after powered on

   Inspect whether its power supply is correct referring to the field wiring diagram; inspect whether the delay period expired.

2. The instrument has no 4-20mA output

   Inspect whether its power supply is correct referring to the field wiring diagram; inspect whether the cables and 4-20mA terminals are connected correctly. If the power supply is okay, LED indicates okay, the instrument should outputs a current of within 4-20mA.

3. Hardware zero point and alarm can not be adjust

   Inspect whether its power supply is correct referring to the field wiring diagram; inspect whether the cables and 4-20mA terminals are connected correctly. According to the relevant part of the user manual, adjust it while the corresponding LED flash. Note, when ALERT LED and DANGER LED flash, It is needed to wait three seconds to adjust the set point.

4. Instrument outputs with great error

   Ensure that the instrument is installed correctly and reliably. Its terminals are connected correctly and reliably.

5. Alarm status is abnormal

   Inspect whether the instrument is powered correctly referring to the field wiring diagram; the cables and the terminals are connected tightly. Make sure that the connected instrument's rated power suffices the relays and triacs' requirement (RELAY: 5A 230VAC/115VAC TRIAC: 5A 230VAC). According to the Alarm option in the category, connect terminals correctly, referring to the field wiring diagram. If the instrument behaves normally, when the alarm set point has been broken and retained for a time of alarm delay, corresponding LED lights up and relay and triac activates.

6. Measurement value increases abruptly or causes false alarm when using high frequency devices(e.g. interphone)

   It is caused by the installation method of vibration switch. The ideal method that all the wires of connecting vibration switch go through the metal conduit. Provibtech recommends to use this method; if there is no this installation condition in the field, it needs to use magnetic ring as the appendix shows. If it doesn't work well, please increase the quantity of magnetic ring according to the field condition. The installation method is as follows:

Note: If the effect is not apparent, wind the wire around the magnetic ring in a circle as the following figure shows or install another magnetic ring adjacent to the first one as the above figures.